

REMARKS

With entry of the foregoing amendment, claims 3-9 are now in the application. No claim has been allowed.

Claims 1 and 2 have been cancelled.

Claim 4 has been rewritten in independent form.

Previously, claims 3 and 5 depended from claim 1. These claims now depend from claim 4.

Claim 6 was previously an independent claim but it now depends from claim 4 as do claims 7 and 8.

Claim 9 is a new claim directed to features of Applicant's invention which are believed to distinguish over the prior art. These features were initially presented as portions of claim 4.

Turning attention now to the office action, the Examiner had rejected claim 1 as being unpatentable over the paper by Cole et al. in view of Holzrichter et al. U.S. Patent 5,729,694.

In response thereto, Applicants have now cancelled claims 1 and 2.

Claim 4, now an independent claim, was rejected under 35 U.S.C. § 103(a) as being unpatentable over Cole et al. in view of Holzrichter and further in view of Hardwick, U.S. patent 5,216,747.

The Examiner was of the opinion that Cole suggests, for segments determined to be inter-word segments, setting corresponding values of a voiced (V) component sample stream to a zero value.

The Examiner in particular pointed to page 492, section 3 of Cole to support his opinion. However that section of Cole actually states that one can perform:

"detection of noise between words and noise removal through spectral subtraction, which eliminates the presence of the noise to enhance electrolaryngeal speech"

The Cole paper at the top of column 2 on page 492 also suggests that certain configurations can be used in a cepstral subtraction stage to provide residual noise reduction. However, spectral/cepstral subtraction is not the same thing as setting corresponding values of the voice component sample stream to a zero value, as recited in Applicant's claim 4.

Therefore, for this reason alone, the rejection should be withdrawn.

Applicant's motivation in setting the voiced component samples to a zero value is to preserve information in the unvoiced (U) samples. By so doing, Applicant can make a more reasoned decision about filtering or suppressing each stream independent of the other stream.

In particular, according to Applicants' process as described beginning at page 8 of the specification and with reference to Applicants' Fig. 4, the input digitized acoustic input signal (I) is submitted to a Discrete Fourier Transform (DFT). Components known to be recognizable as the voiced components (V) of the DFT output are then selected. An Inverse DFT (IDFT) is then taken to provide a time domain version of the voiced (V) components. Once the voiced (V) components has been computed, the unvoiced (U) components are determined by subtracting the V components from the original input signal (I) values.

But, the Applicant's process (as described on page 9 of the specification) and in claim 4 goes on to describe that portions of the voiced components, if determined to be interword segments, are then set to a zero value. At this point the unvoiced values are then added to the altered voiced values.

The resulting stream thus consists of the unvoiced (U) stream as determined by spectral subtraction, but then added to certain voiced (V) segments where selected values were first set to zero.

Such a process is not contemplated by the Cole paper or the other cited references. By suppressing portions of the voiced signal in this manner, the unvoiced component is thus preserved and becomes detectable for further processing. In particular, the unvoiced portion usually consists mostly of turbulent sounds. Electrolaryngeal speech is normally much louder than the turbulence portions, and its energy is concentrated in the fundamental and harmonics. Thus processing the signal in the way that Applicants suggest provides for greater emphasis to be supplied to the unvoiced portions, resulting in a more natural sounding output signal.

The Examiner has failed to point out where the cited references, each particular element of claim 4 is found.

It is also clear that the combination of steps as recited by Applicant provides an advantage that is not available in or suggested by the prior art.

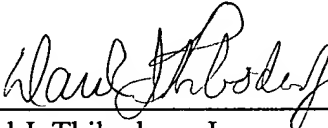
New claim 9 recites the novel features of the Applicant's invention, as directed to zeroing of selected voiced (V) signal components. This claim is also allowable for the same reason as claim 4.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

HAMILTON, BROOK, SMITH & REYNOLDS, P.C.

By 
David J. Thibodeau, Jr.
Registration No. 31,671
Telephone: (978) 341-0036
Facsimile: (978) 341-0136

Concord, MA 01742-9133

Dated: 1/26/05